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ABSTRACT

Earlier studies had shown that differences in measured interests are related to differences in scores on tests of academic ability. Specifically, scores on the college major interest scales of the Kuder Occupational Interest Survey (KOIS) were found to be related to scores on the National Merit Scholarship Qualifying Test (NMSQT). This suggested that a scale could be developed on the KOIS that might relate to academic ability. The NMSQT scores for a sample of 5,000 males were divided into high and low scoring groups. The differences in responses of these two groups to the items on the KOIS were used to develop a scale called academic ability. In a cross validation, the scores on this scale correlated .60 with NMSQT results, suggesting that the scale might be useful for counseling purposes. (Author)

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DEVELOPING AN ACADEMIC ABILITY SCALE

FOR THE KUDER OCCUPATIONAL INTEREST SURVEY

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Paper presented at
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ACADEMIC ABILITY SCALE DEVELOPMENT

An Academic Ability Scale was developed for the Kuder Occupational Interest Survey (KOIS) to see if there was any meaningful relationship between a high school student's interest (as measured by the KOIS) and his academic aptitude (as measured by the National Merit Scholarship Qualifying Examination - NMSQT). Since data was available for students in 21 high schools in and around Philadelphia for both KOIS (Fall '67) and NMSQT (Spring '68), samples were chosen from this population. From the results of the study described below, it is shown that interests and academic aptitudes are in fact related (at least for males).

Student names were matched within each school on the KOIS and NMSQT listings and the NMSQT scores were posted on the KOIS listings. After eliminating students with a V score of less than 46 and/or more than 4 missing responses on KOIS, the students were classified into upper, middle, and lower groups according to the NMSQT national norms for college-bound students for 1968. Samples were then drawn for each sex to form the following six groups.

GROUP	%ile RANGE	NMSQT SCORE	MALES	FEMALES
Upper	68 and above	115 or above	150	150
Middle	35 to 67	96 to 114	75	75
Lower	34 and below	95 or below	75	50

Description & N of samples chosen

One hundred students were then selected at random from each of the upper groups and used to form frequency tables based on the students' 100 KOIS "position pattern" choices. Similar tables were created for the two lower groups and all four tables were converted to percents to reflect the proportion of students choosing each of the six "position pattern."

The frequency tables formed from the lower groups were then subtracted (cell by cell) from the frequency tables formed from the upper groups. (The resulting two matrices - one for each sex - were referred to as difference matrices.) The remaining fifty students were combined with the middle and lower groups for each sex and KOIS scores were created for all 200 students. (KOIS score here refers to the sum of the 100 numbers selected row-by-row from the columns (in the difference matrix) matching each of the student's "position pattern" choices. Thus a positive score would indicate interests closer to the upper group and a negative score would indicate interests closer to the lower group.) The KOIS scores were then correlated with NMSQT scores for each sex and produced correlation coefficients of .66 and ___ respectively for males and females.

Noting that the lower groups were used both in building the difference matrices and as part of the students that were scored, a group of 75 males and a group of 75 females were randomly selected from the remainder of the population to cross-validate the results. Both groups were scored as described above by their respective difference matrices and the resulting scores were correlated with corresponding selection scores. The correlation coefficients this time were .60 for males and ___ for females.

A linear regression equation was established for each sex and the standard error of estimate was found to be 16.16 for males and ____ for females when predicting NMSQT selection scores from KOIS scores for the two validation groups. (See the attached table for the results.)

The statistical results for females were purposely left out because they were not nearly as encouraging as the males and past studies have shown that this should not have been the case. On the contrary, it was expected that the female correlations would have been higher than the males and the standard error of regression lower.

SAMPLE PROCEDURE LAYOUT

I. STUDENT RESPONSE DATA TO THE KUDER OCCUPATIONAL INTEREST SURVEY

	PAT		TERRY		MICKEY		MARY		JACKIE		LEE		CHRIS		ROBIN		KIM		JIM	
	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.	M.	L.
1. Introduce a stranger to people at a large party	●	○	●	○	●	○	●	○	○	●	○	●	●	○	○	●	○	●	○	●
Introduce a stranger to people at a small party	○	●	○	●	○	●	○	●	●	○	●	○	○	●	●	○	●	○	●	○
Let someone else make the introduction	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	●	○	○	●
2. Collect the signatures of famous people	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●
Collect butterflies	○	●	●	○	○	●	○	●	○	●	●	○	●	○	○	●	○	●	○	●
Collect pieces of different kinds of wood	●	○	○	●	○	●	○	●	○	●	○	●	○	●	○	●	●	○	●	○
3. Go on expeditions to find rare animals	○	●	○	●	○	●	○	●	●	○	○	●	○	●	○	●	○	●	●	○
Go on expeditions to find diseases among natives	○	●	●	○	○	●	○	●	○	●	●	○	○	●	○	●	○	●	○	●
Do welfare work	●	○	○	●	○	●	●	○	○	●	○	●	○	●	●	○	●	○	○	●
4. Work where no one can watch you	○	●	○	●	○	●	○	●	●	○	○	●	○	●	○	●	○	●	○	●
Work where only one or two people can watch you	○	●	○	●	○	●	●	○	○	●	●	○	○	●	●	○	●	○	●	○
Work where many people can watch you	●	○	●	○	●	○	○	●	●	○	○	●	●	○	○	●	○	●	○	●
5. Have good health	○	●	○	●	○	●	○	●	●	○	○	●	○	●	○	●	●	○	○	●
Have good friends	●	○	●	○	●	○	●	○	○	●	●	○	●	○	●	○	○	●	●	○
Have high social position	○	○	●	○	○	○	○	●	●	○	○	●	●	○	○	●	●	○	○	●
6. Play a game that requires mental arithmetic	○	○	●	○	○	○	○	●	○	●	○	●	○	●	○	●	●	○	○	●
Play checkers	●	○	○	●	●	○	●	○	●	○	●	○	●	○	○	●	○	●	○	●
Work mechanical puzzles	○	●	●	○	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●
7. Go to a famous night club	○	○	●	○	●	○	○	●	●	○	○	●	●	○	●	○	○	●	○	●
Go to an amusement park	○	●	○	●	○	●	○	●	○	●	●	○	○	●	○	●	●	○	○	●
Go to a party for a famous person	●	○	○	●	○	●	●	○	○	●	○	●	○	●	○	●	○	●	○	●
8. Travel from place to place harvesting crops	●	○	●	○	●	○	●	○	○	●	●	○	○	●	●	○	○	●	●	○
Work in a factory	○	○	○	●	○	●	○	●	●	○	○	●	●	○	○	●	●	○	○	●
Perform in a circus	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●
9. Take a broken lock apart to see what is wrong	●	○	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	●	○
Look for errors in the typewritten copy of a report	○	○	○	●	○	●	●	○	●	○	●	○	●	○	●	○	●	○	○	●
Add columns of figures	○	●	●	○	●	○	○	●	○	●	○	●	○	●	○	●	○	●	○	●
10. Visit an exhibit of famous paintings	○	○	●	○	●	○	○	●	○	●	○	●	●	○	○	●	○	●	○	●
Visit an exhibit of various means of transportation	●	○	○	●	○	●	○	●	○	●	○	●	○	●	○	●	○	●	●	○
Visit an exhibit of laboratory equipment	○	○	○	●	○	●	○	●	○	●	●	○	●	○	○	●	○	●	○	●

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II. POSITION PATTERN NUMBERS

		M	L
1 = P_1+ P_5	4 = P_2+ P_6	1 ○	4 ○
2 = P_1+ P_6	5 = P_3+ P_4	2 ○	5 ○
3 = P_2+ P_4	6 = P_3+ P_5	3 ○	6 ○

III. STUDENT RESPONSE DATA (POSITION PATTERN NUMBERS)

		ITEM NUMBER									
	STUDENT	1	2	3	4	5	6	7	8	9	10
u											
p	Pat	1	5	5	6	3	4	5	1	1	4
p	Terry	5	1	3	1	1	5	4	6	6	4
e	Mickey	1	4	3	5	6	5	2	1	5	2
r											
	Marty	2	2	6	4	1	4	3	2	6	2
	Jackie	3	5	2	1	1	3	1	3	4	6
	Lee	4	3	3	6	4	6	4	2	3	5
	Chris	2	3	2	3	6	4	2	4	4	1
l	Robin	6	1	5	5	5	1	1	5	6	4
o	Kim	5	5	6	6	2	2	3	4	4	6
w	Jan	3	6	2	3	4	3	2	2	1	4
e											
r											

IV. FREQUENCY MATRIX - UPPER GROUP

ITEM	POSITION PATTERN NUMBERS 1	2	3	4	5	6
1	2	0	0	0	1	0
2	1	0	0	1	1	0
3	0	0	2	0	1	0
4	1	0	0	0	1	1
5	0	0	2	0	0	1
6	0	0	0	1	2	0
7	0	1	0	1	1	0
8	2	0	0	0	0	1
9	1	0	0	0	1	1
10	0	1	0	2	0	0

V. FREQUENCY MATRIX - LOWER GROUP

ITEM	POSITION PATTERN NUMBERS 1	2	3	4	5	6
1	0	0	1	0	1	1
2	1	0	0	0	1	1
3	0	1	0	0	1	1
4	0	0	1	0	1	1
5	0	1	0	1	1	0
6	1	1	1	0	0	0
7	1	1	1	0	0	0
8	0	1	0	1	1	0
9	1	0	0	1	0	1
10	0	0	0	2	0	1

VI. DIFFERENCE MATRIX*

ITEM	POSITION PATTERN NUMBERS 1	2	3	4	5	6	Pat's score
1	2	0	-1	0	0	-1	2
2	0	0	0	1	0	-1	0
3	0	-1	2	0	0	-1	0
4	1	0	-1	0	0	0	0
5	0	-1	2	-1	-1	1	2
6	-1	-1	-1	1	2	0	1
7	-1	0	-1	1	1	0	1
8	2	-1	0	-1	-1	1	2
9	0	0	0	-1	1	0	0
10	0	1	0	0	0	-1	0
							8

* The upper and lower matrices were converted to percents before this matrix was formed in the original study.

VII. STUDENT SCORES (ORIGINAL GROUP)

STUDENT	DIFFERENCE MATRIX SCORE	NMSQT SCORE	PREDICTED NMSQT SCORE	DIFFERENCE
Pat	8	128	120	8
Terry	9	124	122	2
Mickey	12	118	129	-11
Marty	1	112	105	7
Jackie	-5	101	97	4
Lee	0	100	103	-3
Chris	-2	98	98	0
Robin	-5	93	92	1
Kim	-7	84	88	-4
Jan	-7	78	88	-10

r = .91

VIII. STUDENT SCORES (VALIDATION GROUP)

STUDENT	STUDENT DIFFERENCE MATRIX SCORE	NMSQT SCORE	PREDICTED NMSQT SCORE	DIFFERENCE
Henry	-8	90	85	+5
Larry	10	116	124	-8
Jim	2	95	107	-12
Sam	-7	92	96	-4
Pete	3	113	109	+4

r = .865

MALE VERIFICATION GRO

	X Kuder Score MAT1	Y Actual NMS SS.	Yc Est NMS	Yc - Y
	-50	87	86.90415813	-0.095841870 19
	-338	60	60.17828455	0.1782845456
	175	108	107.7837469	-0.2162531325
	178	107	108.0621414	1.062141384
5	155	107	105.9277834	-1.072216576
	-109	80	81.42906597	1.429065972
	-75	83	84.58420383	1.584203826
	57	95	96.83356255	1.833562552
	-563	74	76.41796467	2.417964675
10	-180	72	74.84039575	2.840395748
	-50	84	86.90415813	2.90415813
	66	101	97.6687461	-3.331253899
	-65	89	85.51218555	-3.488814453
	108	98	101.5662693	3.566269332
15	89	104	99.80310406	-4.196895939
	-16	98	93.02883749	-4.971162507
	-14	85	90.24489233	5.244892328
	55	102	96.64796621	-5.352033793
	225	107	112.4236555	5.423655476
20	-76	79	84.49140565	5.491405653
	-14	87	92.84324115	5.843241149
	-15	96	90.15209416	-5.847905844
	6	98	92.10085577	-5.899144229
	-19	96	89.78090147	-6.219098533
25	-63	92	85.69778189	-6.302218108
	228	106	112.70203	6.702049992
	-5	98	91.08007588	-6.919924123
	1	99	91.63686491	-7.36313509
	-217	64	71.40686338	7.406863378
30	-151	85	77.53154274	-7.468457259
	-1	99	91.45126857	-7.548731434
	41	103	95.3487918	-7.651208203
	77	91	98.689526	-7.689525995
	-48	95	87.08975447	-7.910245526
35	18	102	93.21443384	-8.785566163
	-90	92	83.19223124	-8.807768757
	86	109	99.52470954	-9.475290455
	-34	85	94.69920459	9.699204592
	-59	76	86.06897458	10.06897458
40	-163	117	106.6701688	-10.3298312
	-191	63	73.81961585	10.81961585
	15	82	92.93603932	10.93603932
	93	89	100.1742967	-11.17429675
	-90	95	83.19223124	-11.80776876
45	-133	117	103.8862236	-13.11377636
	-15	77	90.15209416	13.15209416
	-333	109	122.4458581	13.44585807
	-168	62	75.95397381	13.95397381
	-253	54	68.06612918	14.06612918
50	-90	69	83.19223124	14.19223124
	-98	68	82.44984587	-14.44984587
	224	128	112.3308573	-15.6691427
	-222	96	112.145261	-16.14526096
55	-280	82	65.56057853	-16.43942147

VERIFICATION GROUP

	-50	84	86.90415813	2.90415813
	-66	101	97.6687461	-3.331253899
	-65	89	85.51218555	-3.487814453
	108	98	101.5662693	3.566269332
15	89	104	99.80310406	-4.196895939
	-16	98	93.02883749	4.971162507
	-14	85	90.24489233	-5.244892328
	55	102	96.64796621	-5.352033793
	225	107	112.4236555	5.423655476
20	-76	79	84.49140565	-5.491405653
	-14	87	92.84324115	5.843241149
	-15	96	90.15209416	-5.847905844
	6	98	92.10085577	-5.899144229
	-19	96	89.78090147	-6.219098533
25	-63	92	85.69779189	-6.302218108
	228	106	112.70205	6.702049992
	-5	98	91.08007588	-6.919924123
	1	99	91.63686491	-7.36313509
	-217	64	71.40686338	-7.406863378
30	-151	85	77.53154274	-7.468457259
	-1	99	91.45126857	-7.548731434
	41	103	95.3487918	-7.651208203
	77	91	98.689526	-7.689525995
	-48	95	87.08975447	-7.910245526
35	-18	102	93.21443384	-8.785566163
	-90	92	83.19223124	-8.807769757
	86	109	99.52470954	-9.475290455
	-34	85	94.69920459	9.699204592
	-59	76	86.06897458	10.06897458
40	-163	117	106.6701688	-10.3298312
	-191	63	73.81961585	10.81961585
	15	82	92.93603932	10.93603932
	-93	89	100.1742967	-11.17429675
	-90	95	83.19223124	-11.80776876
45	-133	117	103.8862236	-13.11377636
	-15	77	90.15209416	13.15209416
	-333	109	122.4458581	13.44585807
	-168	62	75.95397381	13.95397381
	-253	54	68.06612918	14.06612918
50	-90	69	83.19223124	-14.19223124
	-98	68	82.44984587	14.44984587
	224	128	112.3308573	15.6691427
	-222	96	112.145261	-16.14526096
	-280	82	65.56057853	-16.43942147
55	-150	61	77.62434091	16.62434091
	-33	106	88.48172706	-17.51827294
	-17	110	89.96649781	-20.03350219
	-232	91	70.0148908	-20.9851092
	-4	70	91.17287405	21.17287405
60	-70	107	85.04819469	-21.95180531
	-81	62	84.02741479	22.02741479
	-122	58	80.22268973	22.22268973
	-70	62	85.04819469	23.04819469
	6	116	92.10085577	-23.89914423
65	-70	122	98.03993879	-23.96006121
	-189	99	74.0052122	24.9947878
	81	74	99.06071868	25.06071868
	-208	102	72.24204693	-29.75795307
	8	62	92.28645212	30.28645212
70	-61	55	85.88337824	30.88337824
	118	68	102.4942511	34.49425105
	89	135	99.80310406	-35.19689594
	73	134	98.31833331	-35.68166669
	158	143	106.2061779	-36.79382206
75	32	57	94.51360825	37.51360825

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ACADEMIC ABILITY SCALE DEVELOPMENT

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Earlier studies had shown that differences in measured interests are related to differences in scores on tests of academic ability. Specifically, scores on the college major interest scales of the Kuder Occupational Interest Survey (KOIS) were found to be related to scores on the National Merit Scholarship Qualifying Test (NMSQT). This suggested that a scale could be developed on the KOIS that might relate to academic ability.

The NMSQT scores for a sample of 5000 males were divided into high and low scoring groups. The differences in responses of these two groups to the items on the KOIS were used to develop a scale called academic ability. In a cross validation, the scores on this scale correlated .60 with NMSQT results, suggesting that the scale might be useful for counseling purposes.

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